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PATENT
1110-0238P

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicant:	Yoshirou YAMAZAKI	Conf.:	1088
Appl. No.:	09/324,123	Group:	2851
Filed:	June 2, 1999	Examiner:	Peter B. KIM

For: METHOD AND APPARATUS FOR READING IMAGES USING CORRECTION CONDITIONS TO PROCESS FINE SCAN DATA

LARGE ENTITY TRANSMITTAL FORM

July 11, 2003

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is an amendment in the above-identified application.

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INDEPENDENT	4	-	4	=	0	$ 84	$0.00
☐ FIRST PRESENTATION OF A MULTIPLE DEPENDENT CLAIM						$280	$0.00
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☐ Please charge Deposit Account No. 02-2448 in the amount of $0.00. This form is submitted in triplicate.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment(s)

(Rev. 04/30/03)

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For:	METHOD AND APPARATUS FOR READING IMAGES USING CORRECTION CONDITIONS TO PROCESS FINE SCAN DATA		

REQUEST FOR RECONSIDERATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

July 11, 2003

Sir:

In response to the Office Action dated April 11, 2003, the following amendments and remarks are respectfully submitted in connection with the above-identified application.

This reply includes:

Claim set as currently pending.

The amendments presented herein comply with the "Revised Amendment Format" as set forth in the Official Gazette Notice dated February 25, 2003. In accordance with the Notice, the provisions of 37 C.F.R. § 1.121(a)-(d) are waived.

CLAIMS SET AS CURRENTLY PENDING

1. (Previously Amended) An image reading method that photoelectrically reads an original image by prescan, sets reading conditions in accordance with prescanned data obtained by the prescan, and performs fine scan that photoelectrically reads the original image to obtain fine scanned data for producing output image data, comprising the steps of:

analyzing both data of a preset area of the original image for both the prescanned data and the fine scanned data to calculate at least respective preset density points of density histograms of the prescanned data and the fine scanned data of said preset area as image characteristic values of the prescanned data and the fine scanned data of said preset area;

calculating a correction condition for the fine scanned data such that the image characteristic values of the prescanned data and fine scanned data match; and

processing the fine scanned data on said correction condition.

2. (Original) The image reading method according to claim 1, wherein said preset area is a central portion of the original image.

3. (Original) The image reading method according to claim 1, wherein said preset are includes a central portion of the original image.

4. (Original) The image reading method according to claim 3, wherein said preset area is an area containing a plurality of portions including the central portion selected among a plurality of divided portions to which the original image is divided.

5. (Previously Amended) The image reading method according to claim 1, wherein said image characteristic value of the preset area is, in addition to said preset density point of the density histogram of the preset area, at least one selected from the group consisting of an average density of the preset area, one or more other preset density points of the density histogram of the preset area, a highlight point of the preset area and a shadow point of the preset area.

6. (Original) The image reading method according to claim 1, wherein said image characteristic value of the preset area is calculated by using both the prescanned data and the fine scanned data which are corrected in device characteristics of means for reading the original image.

7. (Original) The image reading method according to claim 1, wherein both the prescanned data and the fine scanned data used for calculating the image characteristic value of the preset area are data subjected to data processing including dark correction, defective image correction and shading correction, data subjected to log conversion or both.

8. (Previously Amended) An image reading apparatus for reading photoelectrically an original image that, when reading the image, performs prescan before performing fine scan intended to obtain output image data, and sets reading conditions for said fine scan in accordance with prescanned data obtained by the prescan, comprising:

prescan analysis means for analyzing prescanned data of a preset area of the original image to calculate at least a preset density point of a density histogram of the prescanned data of said preset area as an image characteristic value thereof;

memory means for storing fine scanned data obtained by fine scan;

fine scan analysis means for analyzing fine scanned data of the preset area of said original image to calculate at least a preset density point of a density histogram of the fine scanned data of said preset area as an image characteristic value thereof;

correction condition setting means for setting a correction condition for the fine scanned data such that both the image characteristic values calculated by said prescan analysis means and said fine scan analysis means match; and

correction means for reading the fine scanned data from said memory means and correcting the read fine scanned data in accordance with the correction condition set by said condition setting means.

9. (Original) The image reading apparatus according to claim 8, wherein said prescan analysis means and said fine scan analysis means calculate said image characteristic

values by using the prescanned data and the fine scanned data corrected in device characteristics of the image reading apparatus.

10. (Original) The image reading apparatus according to claim 8, wherein the preset area of the original image has a plurality of portions including a central portion.

11. (Previously Amended) The image reading apparatus according to claim 2, wherein said image characteristic value is, in addition to said preset density point of the density histogram of the preset area, at least one selected from the group consisting of an average density of said preset area, one or more other preset density points of the density histogram of said preset area, a highlight point of the preset area and a shadow point of the preset area.

12. (Previously Amended) An image reading method comprising:

performing a first scan of an image and generating first image data;

performing a second scan of the image and generating second image data;

generating a correction condition by processing the first image data and the second image data; and

applying the correction condition to the second image data,

wherein the first scan is performed at a first resolution and the second scan is performed at a second resolution, and

wherein the step of generating the correction condition includes

analyzing the first image data and generating at least respective preset density points of a density histogram of the first image data as a first image characteristic value;

analyzing the second image data and generating at least respective preset density points of a density histogram of the second image data as a second image characteristic value;

comparing the first image characteristic value and the second image characteristic value; and

generating the correction condition such that the first image characteristic value matches the second image characteristic value.

Claim 13 (Canceled)

14. (Previously Added) The method of claim 12 further comprising:

storing the first scan data in a first memory; and

storing the second scan data in a second memory.

15. (Previously Added) The method of claim 12 wherein applying the correction condition to the second image data corrects a difference in first image data and second image data and generates corrected second image data.

16. (Previously Added) The method of claim 15 further comprising generating a second image by processing the corrected second image data.

17. (Previously Amended) An apparatus for reading an image comprising:

a scanner adapted to perform a first scan of an image and a second scan of an image;

a data processor adapted to generate image data from the image which has been scanned by the scanner;

a correction condition setting subsection adapted to compare image data from the first scan and the second scan and develop a correction condition such that the first scan data and the second scan data match, the correction condition setting subsection comparing at least respective preset density points of density histograms of the first scan data and the second scan data; and

a fine scanned data correction section which uses the correction condition to correct the image data from the second scan,

wherein the first scan is performed at a first resolution and the second scan is performed at a second resolution.

18. (Previously Amended) The apparatus of claim 17 further comprising:

a first scan data memory adapted to store the image data from the first scan;

a second scan data memory adapted to store the image data from the second scan;

a first scan analysis section adapted to generate a first image characteristic value from the image data from the first scan, said first image characteristic value corresponding to said preset density points of the density histogram of the first scan data;

a second scan analysis section adapted to generate a second image characteristic value from the image data from the second scan, said second image characteristic value corresponding to said preset density points of the density histogram of the second scan data,

wherein the image data used by the correction condition setting condition subsection to generate the correction condition includes the first image characteristic value and the second image characteristic value.

REMARKS

Claims 1-12 and 14-18 are now present in the application. Claims 1, 8, 12 and 17 are independent. Reconsideration of this application, as amended, is respectfully requested.

Rejection Under 35 U.S.C. § 112

Claim 1-12 and 14-18 stand rejected under 35 U.S.C. § 112, first paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed.

The Examiner asserts that "calculating and comparing of the density histogram of both prescanned data and fine scanned data are not sufficiently disclosed in the specification to enable one skilled in the art to make and/or use the invention." Applicant respectfully submits that the Examiner's rejection is improper for the following reasons.

First of all, calculating a density histogram is well known in the art, and therefore, there is no need to provide such a description in the specification. With regard to the comparing of the density histogram, Applicant submits that this is sufficiently described in the specification. Specifically, once the density histogram is calculated by a known method, the data is analyzed to identify differences between the data to obtain a correction condition. Referring to page 20, third full paragraph through page 21, second full paragraph of the present specification, the determination of the correction condition is described. For example, page 21 describes the use of a simple mean of the image characteristic values to determine the correction condition.

Claims 1, 5, 8, 11, 12, 17 and 18 require that the preset point of a density histogram be calculated as an image characteristic value for each of the prescanned data and the fine scanned data, and the preset points thus calculated be compared with each other. For example, the preset points are compared with each other by finding the difference between the points, rather than comparing two density histograms, one for the prescanned data and the other for the fine scanned data, directly with each other.

The above feature was originally recited in originally presented claim 5. Specifically, original claim 5 recited "said image characteristic value of the preset area is ... one or more preset point of a density histogram of the preset area." This recitation is now substantially presented in the independent claim 1 and other claims. Applicant submits that the Examiner's assertion that the above feature is not enabled is unreasonable at this stage in prosecution. The feature was originally recited in claim 5 as filed, and the Examiner formerly considered this subject matter to be allowable.

In view of the above remarks, Applicant respectfully submits that claims 1-12 and 14-18 are sufficiently described in the specification as originally filed. Accordingly, reconsideration and withdrawal of the rejection under 35 U.S.C. § 112, first paragraph are respectfully requested.

Rejections Under 35 U.S.C. § 103

Claims 1, 5, 6, 8, 9, 12 and 14-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatsumi, U.S. Patent No. 5,745,262 in view of Okamoto, JP 09-065155. Claims 2-4, 10 and 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatsumi as applied to

claims 1 and 8 above, and further in view of Kubo et al., U.S. Patent No. 5,828,461. Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Tatsumi as applied to claim 1 above, and further in view of Sakaguchi, U.S. Patent No. 5,995,201. These rejections are respectfully traversed.

Tatsumi relates to an image read-out and processing apparatus, which carries out prescan (preliminary read-out operation) and fine scan (final read-out operation) and which is used for digital photo printers and so forth, as is the case with the present invention. It is disclosed in Tatsumi that the parameter for color and density correction is determined in accordance with the prescanned data (preliminary readout image information), the determined parameter is corrected in accordance with the fine scanned data, and the correction of the color and density of the fine scanned data is carried out by utilizing the corrected parameter so as to enhance the accuracy of the color and density correction. This results in an image having color and density closer to those as desired (see the claims; column 3, lines 26 to 33; and column 5, lines 32 to 45).

Okamoto relates to an image processing apparatus (picture processor) also used for digital photo printers and so forth. It is disclosed in Okamoto that the apparatus of Okamoto comprises a means for indicating information on highlight finishing, an indication point setting means, a means for determining whether the setting of an indication point is needed or not, and a means for making a selection between the two modes of image processing condition determination based on image information from the indication point only and based on image information from the indication point and from any point other than the indication point. Accordingy, an image of high quality with a favorable highlight can be provided (see the claims: and paragraph [0046]).

In contrast to the above references, the present invention relates to an image reading method and apparatus, in which reading conditions are set by performing prescan and fine scan using the set conditions (claims 1 and 8). As a result of having the configuration as stated above, the present invention makes it possible to compensate for the difference in image data (density information) between the prescan and the fine scan due to the difference in reading conditions so as to output an image of high quality with a high productivity in a stable manner.

In Tatsumi, the parameter for color and density correction is prevented from being made inappropriate due to the errors caused during the prescan in which readout is performed over a wide dynamic range and it is disclosed in the reference to correct a parameter using the difference in the image characteristic value between the prescanned data and the fine scanned data (see column 2, line 57 to column 3, line 33; column 5, lines 11 to 23; etc.).

The present invention is similar indeed to Tatsumi in that the difference in image data (density information) between the prescan and the fine scan due to the difference in reading conditions is compensated for to thereby output an appropriate image in a stable manner. In the apparatus disclosed in Tatsumi; however, as evident from the description in the claims, on column 3, lines 39 to 47 of the specification, and so forth, a temporary parameter (image processing condition) for color and density correction is set using the prescanned data and the temporary parameter is corrected in accordance with the fine scanned data so as to carry out the correction of color and density (image processing) of the fine scanned data by utilizing the parameter thus corrected.

On the other hand, in the present invention, image characteristic values of the prescanned data and the fine scanned data of a preset area are calculated, a correction condition for the fine scanned data is set such that the image characteristic values of the prescanned data and the fine scanned data match, and the difference in image data between the prescan and the fine scan is compensated for by correcting the fine scanned data using the correction condition thus set.

As clearly seen from the above, the present invention and Tatsumi are quite different from each other in the means to achieve the object, namely configuration, although having similar basic objects and effects. Moreover, Tatsumi does not disclose or even suggest the configuration of the present invention, wherein a correction condition for the fine scanned data is set so as to correct the fine scanned data.

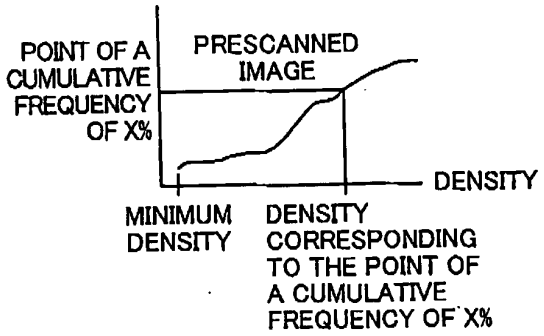
The present invention also has another configuration and effect which are not disclosed or suggested in Tatsumi. In Tatsumi, an image characteristic value used for correcting the parameter for color and density correction is exemplified by the minimum image density of an image, the mean value of the image data (image information) and the median value of the image data, and it is disclosed in the reference to correct the parameter using the difference in such image characteristic values between the prescanned data and the fine scanned data.

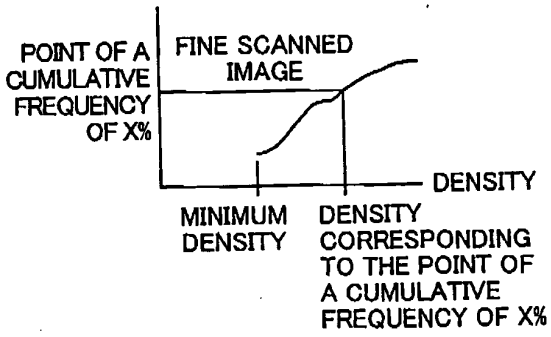
In the present invention, in contrast, a correction condition for the fine scanned data is set using a preset point of a density histogram (point of a frequency of x%) as an image characteristic value, which is not disclosed or suggested in Tatsumi. The present invention as such has the following effects which Tatsumi does not disclose or suggest.

If images are of wide dynamic range such as those on a reversal film, reading may not be performed at a high S/N ratio over the whole density range. In that case, it is often seen that preference is given to the S/N ratio for the density area corresponding to the chief subject (namely, the relevant area is read at a high S/N ratio) for a satisfactory image reproduction so that the gradation is flattened in the highlight or shadow area. For instance, if the highlight area corresponds to the sky and the principal subject comprises people and buildings, the image quality of the principal subject such as people and buildings is set above the reproduction of the gradation of the sky, thus resulting in a flat gradation in the highlight area. In order to avoid this, the quantity of light for fine scan is increased in line with the density range corresponding to the sky and the image of the principal subject is read at a higher S/N ratio, accordingly. As a consequence, signal values of image readings are saturated in the area of the sky if a reading means such as a CCD sensor is used.

When the gradation is maintained during prescan but made flat during fine scan as stated above, for example, when there is a relationship as shown in the reference drawings below between the image data obtained by the prescan and by the fine scan, it is not possible to make such a correction that the difference in image data between the prescan and the fine scan due to the difference in reading conditions is appropriately compensated for, even if the minimum image density, the mean value, the median value, or the like as above is used as an image characteristic value. In other words, in the present invention, the image characteristic values cannot suitably be matched between the fine scanned image and the prescanned image and, in the

case of the apparatus of Tatsumi, the parameter for color and density correction determined by utilizing the prescanned data cannot appropriately corrected.





On the other hand, if a correction condition is set using a preset point (of a frequency of x%) of a density histogram, the image characteristic values can be matched between the prescanned data and the fine scanned data. That is to say, the difference in image data between the prescan and the fine scan due to the difference in reading conditions can be compensated for so as to output a print having a high-quality image reproduced therein in a stable manner, by setting the correction condition for the fine scanned data using a density at an x%-frequency point under which the gradation is still maintained.

Such configuration and effect as described above are in no way disclosed or even suggested in Tatsumi.

Okamoto discloses indeed "the mean density" among "a plurality of areas" and "a density histogram". There is; however, nothing disclosed in both Tatsumi and Okamoto about using the mean density or a preset point of a density histogram as an image characteristic value.

Furthermore, Okamoto discloses exclusively that an image processing condition for the fine scanned data is set using the image characteristic value calculated with the prescanned data and, accordingly, never discloses or even suggests that the parameter set in accordance with the prescanned data is corrected using image characteristic values in order to compensate for the difference in image data between the prescanned data and the fine scanned data or that a correction condition for the fine scanned data is set. As a matter of fact, there is nothing disclosed or suggested in Okamoto not only about compensating for the difference in image data between the prescanned data and the fine scanned data but even difficulties due to the difference in reading conditions.

Accordingly, there is no motivation to combine Tatsumi and Okamoto and, if the two references are combined, it is not possible even for a person skilled in the art to devise such configuration and effect of the present invention that a correction condition for the fine scanned data is set using a preset point of a density histogram as an image characteristic value. As a result, the difference in image data between the prescan and the fine scan can be suitably compensated for so as to output a high-quality image in a stable manner even if images are of wide dynamic range such as those on a reversal film.

In addition, the present invention, as correcting the fine scanned data in order to compensate for the difference in image data between the prescan and the fine scan, has yet another effect which is distinguished from the effects of Tatsumi that corrects the parameter for color and density correction by utilizing the fine scanned data.

In photo printers, the verification is generally performed using finishing-predictive images (simulation images). An image for verification is usually provided using the prescanned data.

In the apparatus of Tatsumi; however, the parameter for color and density correction is corrected in accordance with the fine scanned data so that the color and density properties will be different between the verification image and the output image if fine scan is performed after verification. The output image may have a color and density different from those of the image intended upon verification.

In order to obviate such inconvenience, a verification image needs to be provided after fine scan is completed, thus causing a reduction in operating efficiency. In particular, it is conventional in slit scan reading as performed in the embodiments of the present invention to perform fine scan after all the frames of one case (one film) have been prescanned because the transport of a film is complicated and an extremely large load is applied to a film or a carrier thereof if prescan and fine scan are consecutively performed for every frame. In such a situation, verification cannot be performed until all the frames have been prescanned and then the first frame has been fine scanned so that the operator must be kept waiting for a very long time from the charge of a film to the verification. Accordingly, the operating efficiency is reduced.

In contrast, according to the present invention in which the fine scanned data is corrected and not the parameter for image processing, the verification image and the output image will match for every frame even if the verification image is provided at the end of prescan of the relevant frame and the operator can finish the processing of the case of interest at the time the verification has been completed even in the course of fine scan being performed by the apparatus. This results in a very high operating efficiency.

With regard to dependent claims 2-7, 9-11, 14-16 and 18, Applicant respectfully submits that these claims are allowable due to their respective dependence on independent claims 1, 8, 12 and 17, as well as due to the additional recitations included in these claims.

It should be noted that the rejections of claims 2 to 4, 7, 10 and 11 based on the combination of Tatsumi with Kubo et al. or Sakaguchi are evidently not proper because Tatsumi does not disclose "calculating preset points of the density histograms of both the prescanned data and the fine scanned data as image characteristic values." In addition, Kubo et al. and Sakaguchi also fail to disclose this aspect of the present invention and therefore fail to make up for the deficiencies of Tatsumi.

In view of the above remarks, Applicant respectfully submits that claims 1-12 and 14-18 clearly define the present invention over the references relied on by the Examiner. Accordingly, reconsideration and withdrawal of the Examiner's rejections under 35 U.S.C. § 103 are respectfully requested.

CONCLUSION

Since the remaining references cited by the Examiner have not been utilized to reject the claims, but merely to show the state-of- the-art, no further comments are deemed necessary with respect thereto.

All the stated grounds of rejection have been properly traversed and/or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently pending rejections and that they be withdrawn.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact Paul C. Lewis, Registration No. 43,368 at (703) 205-8000 in the Washington, D.C. area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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